



STUDY OF ANATOMICAL VARIATIONS IN RENAL ARTERIES

Dr. Smita B. Shinde*

M.B.B.S.,M.D., Assistant Professor Department of Anatomy MGM's Medical College and Hospital Aurangabad 431 001 (M.S.) India *Corresponding Author

Dr. Savita Kiste

M.B.B.S.,M.D., Associate Professor, Department of Anatomy Department of Anatomy MGM's Medical College and Hospital Aurangabad 431 001 (M.S.) India

Dr. Suvarna Gulanikar

M.B.B.S.,M.D., Assistant Professor in Anatomy Department of Anatomy MGM's Medical College and Hospital Aurangabad 431 001 (M.S.) India

Dr. Roshan S.

M.B.B.S.,M.D., Associate Professor Kanachur Institute of Medical Science Mangalore, Karnataka

ABSTRACT

Kidneys are supplied by renal arteries branch from abdominal aorta. Present study aim was to find anatomical variations in renal arteries and their clinical correlation. We studied 20 formaline fixed on 40 kidneys during routine abdominal dissection in our department during the period of 8 months. Superior polar artery was observed in 20% kidneys and inferior polar artery was observed in 9.7%. A thorough knowledge of the accessory renal arteries has grown in importance with the increasing number of renal transplantation, different urological procedure and also to the uroradiologist.

KEYWORDS : Anatomical variation, superior polar arteries, inferior polar arteries.

Introduction:

The kidneys are important organ in body forming urinary system. It receives majority of cardiac output through renal arteries. Renal arteries are end arteries with no anastomosis. Kidneys secrete the excess water and salts and one of the vital organ human body. Knowledge concerning the varieties in renal vascular anatomy have assumed increase importance as renal transplantation, renovascular hypertension, vascular reconstruction for both congenital and acquired lesions and reconstruction surgery for abdominal aortic aneurysms have become more common place in clinical surgical practice.¹ There is nonconformity in the literature regarding the nomenclature of renal arteries other than the main renal artery they have been variously described as "accessory", "Aberrant", "Supernumerary", "Multiple", accessory "aortic hilar", "Aortic superior polar", "aortic inferior polar" and anomalous.²

The renal and gonadal arteries usually arises from anterolateral or lateral aspect of abdominal aorta.^{3,4} From the published studies and reports about accessory renal arteries it can be calculated that the average rate of occurrence is approximately 30%.³ It is important to be aware that accessory renal arteries are end arteries; therefore, if an accessory artery is damaged, the part of kidney supplied by it is likely to become ischaemic.⁴

The objective of this study was to bring awareness to clinicians about the variation in renal artery. Present study also useful in clinicians performing invasive technique.

Materials and Methods:

The present study was performed during January 2017 to August 2017 in the Department of Anatomy, MGM's Medical College and Hospital, Aurangabad (M.S.). Total 40 kidneys from 20 cadavers during routine anatomical dissection were taken for the study. The kidneys and their vasculature were carefully observed and variation in morphologies of renal arteries was noted.

The material required for the study was scalpel, forceps, scissors, brush, cotton, glycerin, gloves and oil paint.

Results : Table – 1 : Showing distribution of renal arteries of right and left kidneys

Arteries	Right kidney n=23 (%)	Left kidney n = 21 (%)	Total (%) n = (%)
Single renal artery	12 (30%)	16 (40%)	28 (70%)
Superior polar artery	06 (15%)	02 (5%)	08 (20%)
Inferior polar artery	03 (7.5%)	01 (2.5%)	04 (10%)

In our study, there are anatomical variations in the renal vascularization. We observed single renal artery in 12 out of 40 kidneys (30%) on right side and 16 out of 40 kidneys (40%) on left side which are normal originating from abdominal aorta. Superior polar arteries 6 (15%) right side and 2 (5%) left side. Inferior polar arteries 3 on right side (7.5%) and one on left side (2.5%). These arteries includes extra hilar arteries, they are entering in the kidney through one of pole i.e. upper pole or lower pole.

Out of 40 kidneys upper polar arteries from main renal artery were observed in 8 kidneys (%). Upper polar arteries – on right side we observed 6 out of 8 (%) and left side it was 2 out of 8 (%). Upper polar arteries were observed it was smaller in caliber than main renal artery and it pierces the renal parenchyma and supply upper pole of kidney. (Table No. 1, Fig No. 1 & 2)

Discussion :

There are various types of renal arteries by there positions, how they enter in kidney such as hilar, extra hilar, superior polar, inferior polar arteries. We observed single renal artery in 14 out of 40 kidneys (35%) on right side and 18 out of 40 kidneys (45%) on left side which are normal originating from abdominal aorta. In our study superior polar arteries 6 (15%) right side and 2 (5%) left side. Inferior polar arteries 3 on right side (7.5%) and one on left side (2.5%). These arteries includes extra hilar arteries, they are entering in the kidney through one of pole i.e. upper pole or lower pole.

Out of 40 kidneys upper polar arteries from main renal artery were observed in 8 kidneys (%). Upper polar arteries – on right side we observed 6 out of 8 (%) and left side it was 2 out of 8 (%). Upper polar arteries were observed it was smaller in caliber than main renal artery and it pierces the renal parenchyma and supply upper pole of kidney.

Various studies reported various findings on the branching pattern of renal arteries. Khamanarong et al (2004) observed 7% of superior polar artery and 3% of inferior polar arteries.⁵ Cicekcibasi et al (2005) observed 3.3% of superior polar arteries and 10.5% of inferior polar arteries.⁶ Weld et al (2005) noted 9.6% of superior polar arteries and 15.1% inferior polar arteries in their study.⁷ Saldarriaga et al (2008) noticed 4.3% of superior polar and 10.8% inferior polar arteries in their study.⁸ Palmieri et al (2011) studied on kidneys and observed 9.4% of superior polar arteries and 3.2% of inferior polar arteries.⁹ Budhiraja et al (2013) showed 13.1% of superior and 7.1% inferior polar arteries.¹⁰ Khajuria et al (2015), they observed 15% of superior arteries and 5% of inferior polar arteries in their study.¹¹ Our findings were more or less correlated with the study of Khajuria et al (2015).

Conclusions:

Thus we conclude from our study that, upper polar artery and lower polar artery supplying different segments of the kidneys. To know its origin and variations it is important for radiologist, urologists and also in transplant surgeries because its damage may produce infarction to that segment.



Fig. 1: Photograph of right kidney showing upper polar artery.



Fig. 2: Photograph of right kidney showing lower polar artery.

REFERENCES

1. Harrison LH, Flye MW, Seigler HF. Incidence of anatomical variants in renal vascular in the presence of normal renal function. *Ann Surg* 1978 July;188(1):83-89.
2. Bayramoglu A, Demiryurek D, Erbil KM. Bilateral additional renal arteries and an additional right renal vein associated with unrotated kidneys. *Saudi Med J* 2003;24(5):535-37.
3. Kocabiyik N, Yalcin B, Kilic C, Kirici Y, Ozan H. Accessory renal arteries and an anomalous testicular artery of high origin. *Gülhane Tip Dergisi* 2005;47:141-43.
4. Nayak BS. Multiple variations of the right renal vessels. *Singapore Med J* 2008; 49(6):e153-e155.
5. Khamanarong K, Parachane P, Utraravichin A, Tong-Un T, Sriparoaya K. Anatomy of renal arterial supply. *Clinical Anatom* 2004;17(4):334-36.
6. Cicekcibasi AE, Ziyilan T, Salbacak A, Seker M, Buyukmumcu M, Tuncer I. An investigation of the origin, location and variations of the renal arteries in human fetuses and their clinical relevance. *Anna Anat* 2005;187(4):421-27.
7. Weld KJ, Bhayani SB, Belani J, Ames CD, Hruby G, Landman J. Extra renal vascular anatomy of kidney, assessment of variations and their relevance to partial nephrectomy. *Urology* 2005;66(5):985-89.
8. Saldarriaga B, Perez AF, Ballesteros LE. A direct anatomical stud of additional renal arteries in a Colombian mestizo population. *Folia Morphologica* 2008;67(2):129-134.
9. Palmieri BJ, Petroianu A, Silva LC, Andrade LM, Alberti LR. Study of arterial pattern of 200 renal pedicle through angiography. *Rivista do colegio Brasileiro de Cirurgioes* 2011;38(2):116-21.
10. Budhiraja V, Rostogi R, Jain V, Bankwar V. Anatomical variations of renal artery and its clinical correlations; a cadaveric study from central India. *J Morphol Sci* 2013;30(4):228-33.
11. Khajuria SR, Saini H, Agarwal RK, Kour N. Variation in renal arteries with presence of upper polar segmental artery. *Int J Basic Appl Med Sci* ISSN:2277-2103 (Online) An open access, <http://www.cibtech.org/jms.htm> 2015;5(2):128-31.